IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Application No.:	10/708,186
Filing Date:	February 13, 2004
Inventor (first named):	David Sutherland
Group Art Unit:	1745
Examiner Name:	GREGG CANTELMO
Attorney Docket No.:	45283.118

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Eileen Lucas

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DATED: August 28, 2007

APPEAL BRIEF UNDER 37 C.F.R. 41.37
IN RESPONSE TO FINAL OFFICE ACTION MAILED MARCH 30, 2007

To: Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Notice of Appeal was timely filed JUNE 28, 2007, and the following appeal brief is filed within two months of filing the Notice of Appeal.

Applicant is providing an Appeal Brief under 37 C.F.R. 41.37(c)(1), with regard to claims 1-9.

APPEAL BRIEF UNDER 37 C.F.R. 41.37(C)(1)

Applicant provides Appeal Brief under 37 C.F.R. 41.37(c)(1). The Appeal Brief is filed within the time allowed for Appeal Brief of two months after filing the Notice of Appeal under 37 C.F.R. 41.37(a)(1). The fee for this Appeal Brief is $500.00 under 35 U.S.C. 41(a)(6)(B). Fee payment by Credit Card form is transmitted herewith.

(i) Real Party in Interest

The real parties in interest are the applicants David Sutherland, Vlad Kalika and Scott Sherman.

(ii) Related Appeals and Interferences

There are no prior or other pending appeals, judicial proceedings or interferences known to the Appellant which may be related to, directly affect or be directly affected by or have any bearing on the Board's decision in the pending appeal.

(iii) Status of Claims

Claims 1-9 are rejected and are under appeal.

(iv) Status of Amendments

Amendments to paragraph [0027] of the specification and to Figures 1 and 4 dated 03/22/2007, were filed subsequent to the final rejection mailed 03/30/2007 and have not yet been entered by the Examiner.

(v) Summary of Claimed Subject Matter

The present invention is directed to an improved interface between a current collector and a

terminal interconnect in a solid oxide a fuel cell to minimize uneven loading on the adjacent terminal fuel cell. In particular, the present invention relates to a planar solid oxide fuel cell stack comprising a floating current collector. The current collector floats because it does not directly contact the interconnect to which it is immediately adjacent. This is achieved using a seal and a compressible material positioned between the current collector and the terminal interconnect.

According to Figure 4, the planar solid oxide fuel cell stack of independent claim 1 comprises a compression plate (51), a cathode current collector (50), a terminal interconnect (52), a seal (58) having a cell opening (56) and a compressible conductive element (60). The compressible member (60) is a metal foam, in particular a nickel foam. In one embodiment the seal element defines a passage (62) from the fuel intake manifold, to the fuel exhaust manifold such that fuel may pass through the compressible element (60). In one embodiment the interconnect has flow directing ribs (54).

A listing of claims 1-9 is set forth in the Claims Appendix below.

(vi) Grounds of Rejection to be Reviewed on Appeal

1. Whether the amendments made to paragraph [0027] of the specification and to Figure 4 are properly rejected under 35 U.S.C. 132(a) as introducing new subject matter.

2. Whether claims 1-9 are properly rejected under 35 U.S.C 102(b) as being anticipated by Donelson (WO 98/57384).

(vii) Argument

1. Whether the amendments made to the specification and Figure 4 are properly rejected under 35 U.S.C. 132(a) as introducing new subject matter.

In Applicant's response dated March 22, 2007, Applicant amended Figure 4 to depict a bottom compression plate (51) as requested by the Examiner. Applicant also amended

paragraph [0027] to reflect amended Figure 4. However, Examiner rejected such amendments under 35 U.S.C. 132(a) on the basis that the amendments introduced new subject matter into the disclosure of the invention. Applicant respectfully submits that the aforementioned amendments do not constitute new subject matter and should therefore be allowable. Claim 1 of the application as filed includes upper and lower compression plates. Paragraph [0010] of the summary as originally filed references compression plates. Further, the first sentence of paragraph [0027] of the description. as originally filed refers to a compression plate as follows: "*As seen in Fig. 4, a fuel cell stack includes a bottom compression plate (not shown) adjacent to the cathode current collector (50).*"

In support of Applicant's position, Applicant refers to MPEP 2163.06 which reads as follows:

> "Lack of written description is an issue that generally arises with respect to the subject matter of a claim. If an applicant amends or attempts to amend the abstract, specification or drawings of an application, an issue of new matter will arise if the content of the amendment is not described in the application as filed. **Stated another way, information contained in any one of the specification, claims or drawings of the application as filed may be added to any other part of the application without introducing new matter.**"

In summary, the claims and the description of the application as originally filed, describe the compression plate as discussed above. Therefore, the drawings may be amended by the Applicant to reference such element without adding new subject matter. Reconsideration of the rejection of the amendments to Figure 4, and paragraph [0027] is respectfully requested.

2. **Whether claims 1-9 are properly rejected under 35 U.S.C 102(b) as being anticipated by Donelson (WO 98/57384).**

Examiner has rejected claims 1-9 under 35 U.S.C. 102 (b) as being anticipated by WO 98/57384 to Donelson *et al* (Donelson). Donelson is directed to a fuel cell assembly that seeks to overcome the problems of the breakage of solid oxide electrolyte fuel cells due to tensile forces arising from uneven and excessive loading placed on the fuel cells (see page 2, lines 6-15, and page 3, lines 1-2). Donelson attempts to solve this problem using a combination of spacer plates (34) and compression members (32). The spacer plate (34) defines a chamber (36) between the interconnect members (24 and 26) and the fuel cell (16) and a compression member (32) is inserted into such chamber to provide an even distribution of force onto the surface of the fuel cell (16) (see page 10, lines 16-30).

Donelson is concerned with the physical relationship of the interconnect members with the fuel cells (comprising an electrolyte layer, an anode layer and a cathode layer), and loading dynamics between the same. As stated on page 1, lines 4, Donelson is "particularly concerned with such a fuel cell assembly in which the compressive load on each fuel cell is independent of its position in the stack."

On page 1, lines 13-19, of Donelson, the purpose, concept and function of terminal interconnects is discussed. Furthermore, the physical location of the terminal interconnect at the end of the fuel cell stack in both single and stacked fuel cells is identified.

The present invention is also directed to the problem of fuel cell breakage caused by compressive loading of fuel cell stacks. However, the present invention is <u>not</u> directed to an assembly of elements between the interconnects and the adjacent fuel cells, but rather is directed to the physical relationship between current collector plates adjacent to the compression plates at each end of the fuel cell and the terminal interconnects at each end of the fuel cell stack.

The present invention is directed to trying to mitigate unbalanced compressive forces imparted by the current collectors (adjacent to the compression plates) on the terminal interconnect which in turn imparts a compressive force on the terminal fuel cell. See paragraph [0007] of the present application:

> "A fuel cell stack must be carefully compressed to ensure the seals between the interconnects and the fuel cells function properly and the appropriate electrical contact is made, without cracking the ceramic fuel cells, which are typically quite brittle. As a result, the interface between the current collectors and the terminal fuel cell is important. The terminal fuel cell has a tendency to crack when the stack is compressed due to uneven pressure points exerted by the terminal interconnect due to its inherent rigidity. This is particularly true at the cathode end of the fuel cell stack as the cathode may directly contact portions of the terminal interconnect."

As seen in Figure 4 of the present application, the current collector plates are independent elements that are not in physical contact with the fuel cell, rather they are separated from the fuel cell by the terminal interconnect. See in particular paragraph [0005] of the present application:

> "The fuel cells are typically combined in series and a cathode current collector is provided at one end of the stack and an anode current collector is provided at the other end of the stack. The current collector in either case is typically a solid metal plate which contacts the terminal interconnect which in turn contacts the electrode of the terminal fuel cell and may include manifold passages, if the stack is internally manifolded, as well as a tab for connecting a current conductor cable."

Donelson does not disclose or teach an assembly that addresses the loading between current collection plates and terminal interconnects. Examiner has pointed to certain elements of Donelson and argues that such elements have similar functional aspects as elements of the present application and are thus analogous. For example, in Examiner's office action, Examiner states that Donelson discloses "a cathode current collector plate 22 and an anode collector plate 18". A close review of Donelson discloses that elements

22 and 18 are in fact part of the fuel cell 16 which is comprised an electrolyte layer 20, a cathode layer 22 and an anode layer 18 (see page 9 lines 3-16). While the cathode layer and the anode layer of a fuel cell may share some functional characteristics with a current collector plate, they are clearly not analogous elements and assertions to the contrary ignores the teachings of the specifications of both the present application and Donelson which clearly identify them as different elements positioned differently in the fuel cell stack. This is not simply a case of differing semantics in identifying elements, but rather a situation where two applications are dealing with different parts of a common system. Donelson deals with a system directed to the interface between interconnects and fuel cells, while the present invention is directed to the interface between the current collectors and the terminal interconnects. The common goal of preventing fuel cell breakage does not render the inventions of Donelson and the present application one and the same. The Applicant respectfully submits that one skilled in the art could not have combined their own knowledge with the teachings of Donelson to reach the present invention. To anticipate, a piece of prior art must be enabling. *Chester* v. *Miller*, 906 F.2d at 1576 n.2, 15 U.S.P.Q. 2d at 1336 n.2 (Fed Cir. 1990).

Donelson does not disclose or teach a floating current collector. The knowledge of one skilled in the art can only be used to explain the meanings of references, it cannot be used to fill in gaps in the teaching of the prior art *Scripps Clinic & Research Found.* v. *Genetech, Inc.*, 927, F2.d at 1576, 18 U.S.P.Q.2d at 1010 (Fed. Cir. 1991). There is a gap in the teaching of Donelson in that it does not address the interface of terminal interconnects with current collectors. As such independent claims 1-9 directed to fuel stacks having floating current collectors are not anticipated by Donelson and should be allowed.

(viii) Claims Appendix

1. (Original) A planar solid oxide fuel cell stack comprising a lower horizontal compression plate, an upper compression plate, a plurality of interleaved fuel cells, seals and interconnects, a cathode current collector plate and an anode current collector plate disposed between the upper

and lower compression plates, wherein the stack defines vertical fuel intake and exhaust manifolds and vertical air intake and exhaust manifolds, said stack comprising:

(a) a seal element having a cell opening;

(b) a compressible, conducting element disposed within the cell opening of the seal element;

(c) wherein the seal element and the compressible element are disposed between the cathode current collector plate and a terminal interconnect at the cathode end of the stack or between the anode current collector plate and a terminal interconnect at the anode end of the stack, or both.

2. (Original) The fuel cell stack of claim 1 wherein the compressible element comprises a metal foam.

3. (Original) The fuel cell stack of claim 2 wherein the compressible element comprises a nickel foam.

4. (Original) The fuel cell stack of claim 1 wherein the seal element defines a small fuel passage from the fuel intake manifold to the fuel exhaust manifold such that fuel may pass through or around the compressible element.

5. (Original) The fuel cell stack of claim 1 wherein the interconnect comprises flow-directing ribs in contact with an electrode surface and the conducting element.

6. (Original) A planar solid oxide fuel cell stack having a compression plate and a terminal fuel cell, said fuel cell stack comprising:

(a) a current collector plate comprising a substantially planar element disposed immediately adjacent the compression plate;

(b) an interconnect plate disposed immediately adjacent and in electrical contact with the terminal fuel cell;

(c) a compressible layer comprising a compressible electrically conductive element in electrical contact with the interconnect plate and the current collector plate.

7. (Original) The fuel cell stack of claim 6 wherein the compressible layer further comprises a seal element surrounding the compressible element.

8. (Original) The fuel cell stack of claim 7 wherein the compressible element comprises an oxidizable material, and the seal element defines a fuel passage for diverting fuel from a fuel intake manifold, through or around the compressible element, and into a fuel exhaust manifold.

9. The fuel cell stack of claim 8 wherein the compressible element comprises nickel foam.

(ix) Evidence Appendix

There has been no evidence submitted under 37 C.F.R. 1.130, 1.131 or 1.132.

Copies of evidence relied upon as grounds of rejection in Final Office Action dated 08/23/2005 are listed below.

1. WO 98/57384 to Donelson

(x) Related Proceedings Appendix

None.

Respectfully submitted,

David Sutherland, et al.

By: _____
Edward Yoo (Reg. No. 41,435)

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